

# Claims

- [c1] 1.A system for quantifying baseline model quality, comprising:
- an engine service database containing engine data;
  - a preprocessor for processing the engine data into a predetermined format;
  - an engine baseline modeling component that builds an engine baseline model from the preprocessed data, wherein the engine baseline model relates engine performance variables as a function of engine operating conditions; and
  - a model diagnostics component that evaluates the performance of the engine baseline model, wherein the model diagnostics component includes:
    - means for comparing engine data from a plurality of engines against the engine baseline model;
    - means for generating engine trends for each of the plurality of engines;
    - means for identifying correlations between the engine trends and various parameters; and
    - means for calculating, for each identified correlation, summary statistics relating to the degree of correlation.

- [c2] 2.The system of claim 1, wherein the means for identifying correlations between engine trends and various parameters further generate correlation coefficients for each identified correlation.
- [c3] 3.The system of claim 1, wherein the summary statistics include at least one of a standard deviation, a mean, or a histogram for each identified correlation.
- [c4] 4.The system of claim 3, wherein a good model is best represented by summary statistics tending toward zero.
- [c5] 5.A system for quantifying baseline model quality, comprising:  
an engine service database containing engine data;  
a preprocessor for processing the engine data into a predetermined format;  
an engine baseline modeling component that builds an engine baseline model from the preprocessed data,  
wherein the engine baseline model relates engine performance variables as a function of engine operating conditions; and  
a model diagnostics component that evaluates the performance of the engine baseline model, wherein the model diagnostics component includes:  
means for evaluating, a subset of the engines used to create the model in time order against the generated

baseline;

means for generating time-varying system trends;

means for plotting data points representative of the

time-varying system trends over time; means for fitting a

smoothed curve to the plotted data points; and

means for computing residual errors for each point.

[c6] 6. The system of claim 5, wherein residual errors computed reflect the amount by which each trend point varies from the smoothed curve.

[c7] 7. The system of claim 5, wherein the model diagnostics component further comprises:  
means for estimating a sigma value by performing a root mean squared error calculation; and  
means for generating summary statistics using the estimated sigma values.

[c8] 8. The system of claim 7, wherein a good model is best represented by lower estimated sigma values.

[c9] 9. A method for quantifying baseline model quality, comprising:  
storing engine data in an engine service database;  
processing the engine data into a predetermined format;  
building an engine baseline model from the preprocessed data, wherein the engine baseline model relates

engine performance variables as a function of engine operating conditions;  
evaluating performance of the engine baseline model;  
comparing engine data from a plurality of engines against the engine baseline model;  
generating engine trends for each of the plurality of engines;  
identifying correlations between the engine trends and various parameters; and  
calculating, for each identified correlation, summary statistics relating to the degree of correlation.

[c10] 10.The method of claim 9, wherein identifying correlations between engine trends and various parameters further comprises generating correlation coefficients for each identified correlation.

[c11] 11.The method of claim 9, wherein the summary statistics include at least one of a standard deviation, a mean, or a histogram for each identified correlation.

[c12] 12.The method of claim 11, wherein a good model is best represented by summary statistics tending toward zero.

[c13] 13.A method for quantifying baseline model quality, comprising:

storing engine data in an engine service database;  
processing the engine data into a predetermined format;  
building an engine baseline model from the preprocessed data, wherein the engine baseline model relates engine performance variables as a function of engine operating conditions;  
evaluating performance of the engine baseline model;  
evaluating a subset of the engines used to create the model in time order against the generated baseline;  
generating time-varying system trends;  
plotting data points representative of the time-varying system trends over time; fitting a smoothed curve to the plotted data points; and  
computing residual errors for each point.

[c14] 14. The method of claim 13, wherein residual errors computed reflect the amount by which each trend point varies from the smoothed curve.

[c15] 15. The method of claim 13, further comprising:  
estimating a sigma value by performing a root mean squared error calculation; and  
generating summary statistics using the estimated sigma values.

[c16] 16. The method of claim 15, wherein a good model is best represented by lower estimated sigma values.

[c17] 17. A computer-readable medium incorporating instructions for quantifying baseline model quality, comprising: one or more instructions for storing engine data in an engine service database; one or more instructions for processing the engine data into a predetermined format; one or more instructions for building an engine baseline model from the preprocessed data, wherein the engine baseline model relates engine performance variables as a function of engine operating conditions; one or more instructions for evaluating performance of the engine baseline model; one or more instructions for comparing engine data from a plurality of engines against the engine baseline model; one or more instructions for generating engine trends for each of the plurality of engines; one or more instructions for identifying correlations between the engine trends and various parameters; and one or more instructions for calculating, for each identified correlation, summary statistics relating to the degree of correlation.

[c18] 18. The computer-readable medium of claim 17, wherein the one or more instructions for identifying correlations between engine trends and various parameters further comprise one or more instructions for generating corre-

lation coefficients for each identified correlation.

- [c19] 19.The computer-readable medium of claim 17, wherein the summary statistics include at least one of a standard deviation, a mean, or a histogram for each identified correlation.
- [c20] 20.The computer-readable medium of claim 19, wherein a good model is best represented by summary statistics tending toward zero.
- [c21] 21.A computer-readable medium for quantifying baseline model quality, comprising:  
one or more instructions for storing engine data in an engine service database;  
one or more instructions for processing the engine data into a predetermined format;  
one or more instructions for building an engine baseline model from the preprocessed data, wherein the engine baseline model relates engine performance variables as a function of engine operating conditions;  
one or more instructions for evaluating performance of the engine baseline model;  
one or more instructions for evaluating a subset of the engines used to create the model in time order against the generated baseline;  
one or more instructions for generating time-varying

system trends;  
one or more instructions for plotting data points representative of the time-varying system trends over time; one or more instructions for fitting a smoothed curve to the plotted data points; and  
one or more instructions for computing residual errors for each point.

[c22] 22. The computer-readable medium of claim 21, wherein residual errors computed reflect the amount by which each trend point varies from the smoothed curve.

[c23] 23. The computer-readable medium of claim 21, further comprising:  
one or more instructions for estimating a sigma value by performing a root mean squared error calculation; and  
one or more instructions for generating summary statistics using the estimated sigma values.

[c24] 24. The computer-readable medium of claim 23, wherein a good model is best represented by lower estimated sigma values.